

Nuclide Charts and the Nuclide Explorer

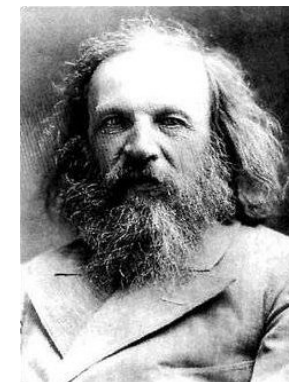
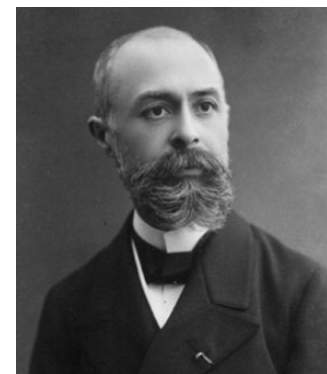
Friday, 10th Oct. 2008

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<http://www.nucleonica.net>
<http://www.karlsruhenuclidechart.net>

- ➔ A graphical tool to visualise physical properties of some nuclides chosen in some adequate database.
- ➔ Different kind of nuclide charts are available, but not all of them are reliable.
- ➔ Nucleonica provides two online chart tools:
 - Nuclide Explorer
 - Universal Nuclide Chart (Java applet)
- ➔ The “Karlsruhe Nuclide Chart”, an unique nuclide database

- ➔ Mendeleev table 1869, Chemical properties, Mass Number
- ➔ H. Becquerel 1896, discovery of radioactivity
- ➔ With Curie, Rutherford, Fermi, Hahn, Wigner, Bohr, knowledge of the nucleus structure
- ➔ Soddy, Moseley, De Hevesy, isotopes
- ➔ Representation of nuclides in a proton/neutron map system (Fea, 1935, Seaborg, 1940, Segrè, 1945)
- ➔ 1958 first edition of the “Karlsruher Nuklidkarte” W. Seelmann-Eggebert and G. Pfennig from the Karlsruhe Radiochemical Institute.
- ➔ Increasing number of applications of Nuclear Science (including Physics, Chemistry, Geology, Physiology and Medicine)

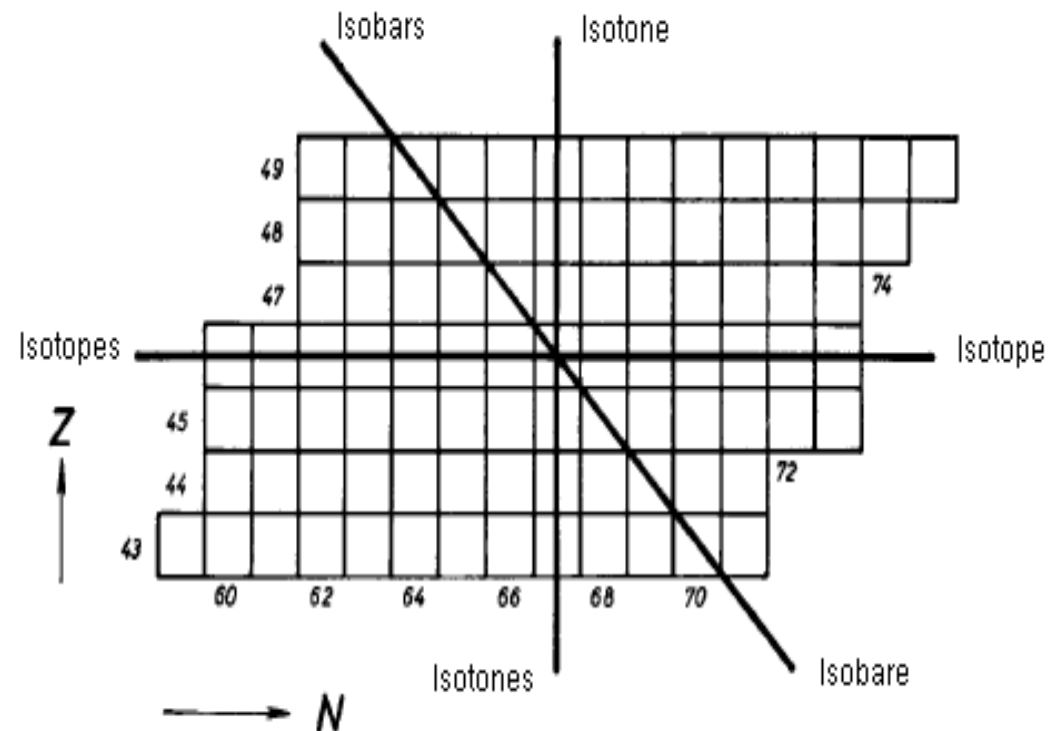


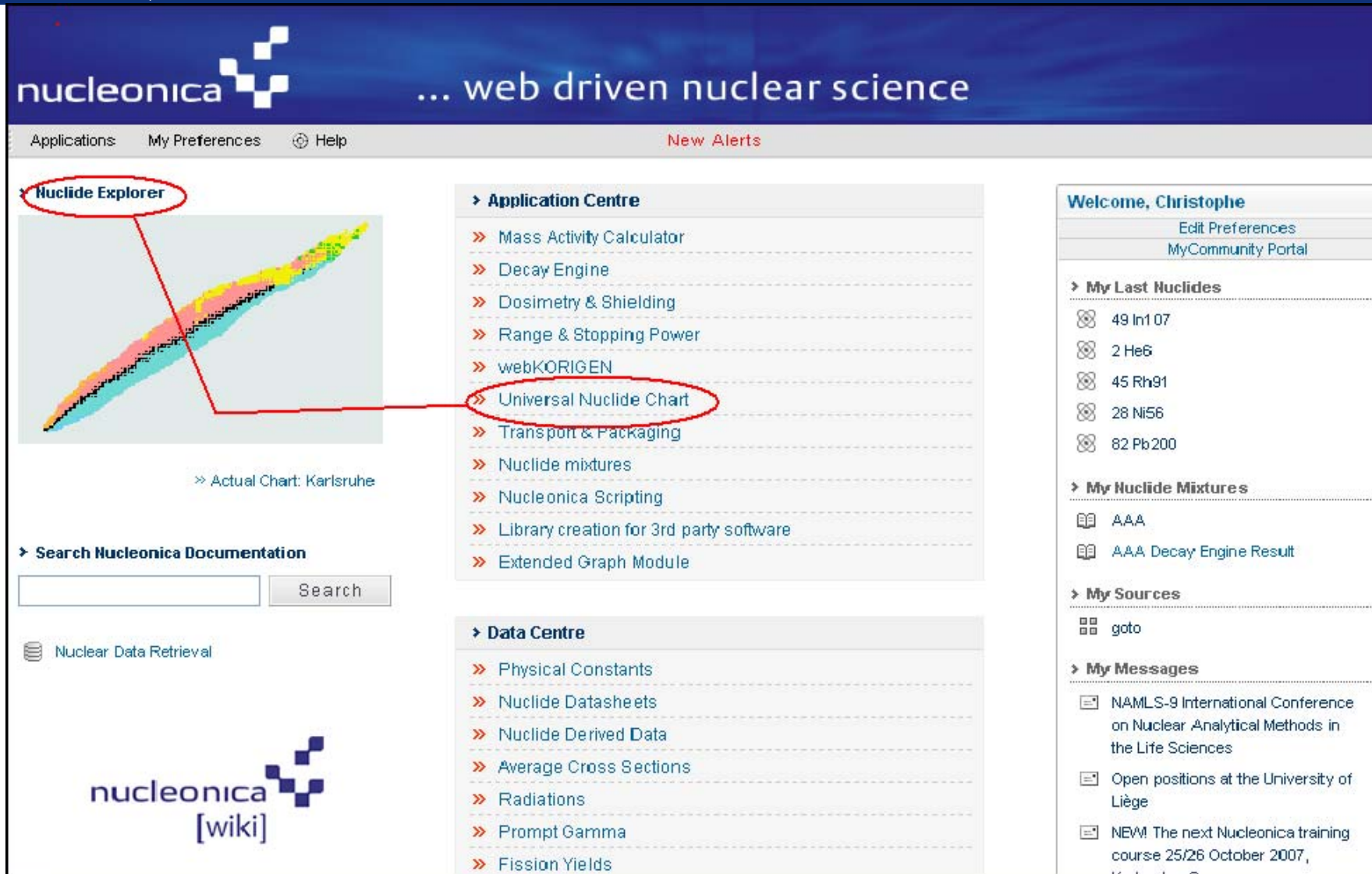
Nuclide : *A type of atom specified by its atomic number, Z , mass number, A , and energy state.*

Isotopes : *meaning at the same place in the periodic table ➡ nuclides with same Z .*

Isotones : *nuclides with the same $N (=A-Z)$.*

Isobars : *nuclides with the same A .*





nucleonica ... web driven nuclear science

Applications My Preferences Help New Alerts

Nuclide Explorer

>> Actual Chart: Karlsruhe

Application Centre

- >> Mass Activity Calculator
- >> Decay Engine
- >> Dosimetry & Shielding
- >> Range & Stopping Power
- >> webKORIGEN
- >> **Universal Nuclide Chart**
- >> Transport & Packaging
- >> Nuclide mixtures
- >> Nucleonica Scripting
- >> Library creation for 3rd party software
- >> Extended Graph Module

Data Centre

- >> Physical Constants
- >> Nuclide Datasheets
- >> Nuclide Derived Data
- >> Average Cross Sections
- >> Radiations
- >> Prompt Gamma
- >> Fission Yields

Search Nucleonica Documentation

Search

Nuclear Data Retrieval

Welcome, Christophe

[Edit Preferences](#)
[MyCommunity Portal](#)

My Last Nuclides

- 49 In107
- 2 He6
- 45 Rh91
- 28 Ni56
- 82 Pb200

My Nuclide Mixtures

- AAA
- AAA Decay Engine Result

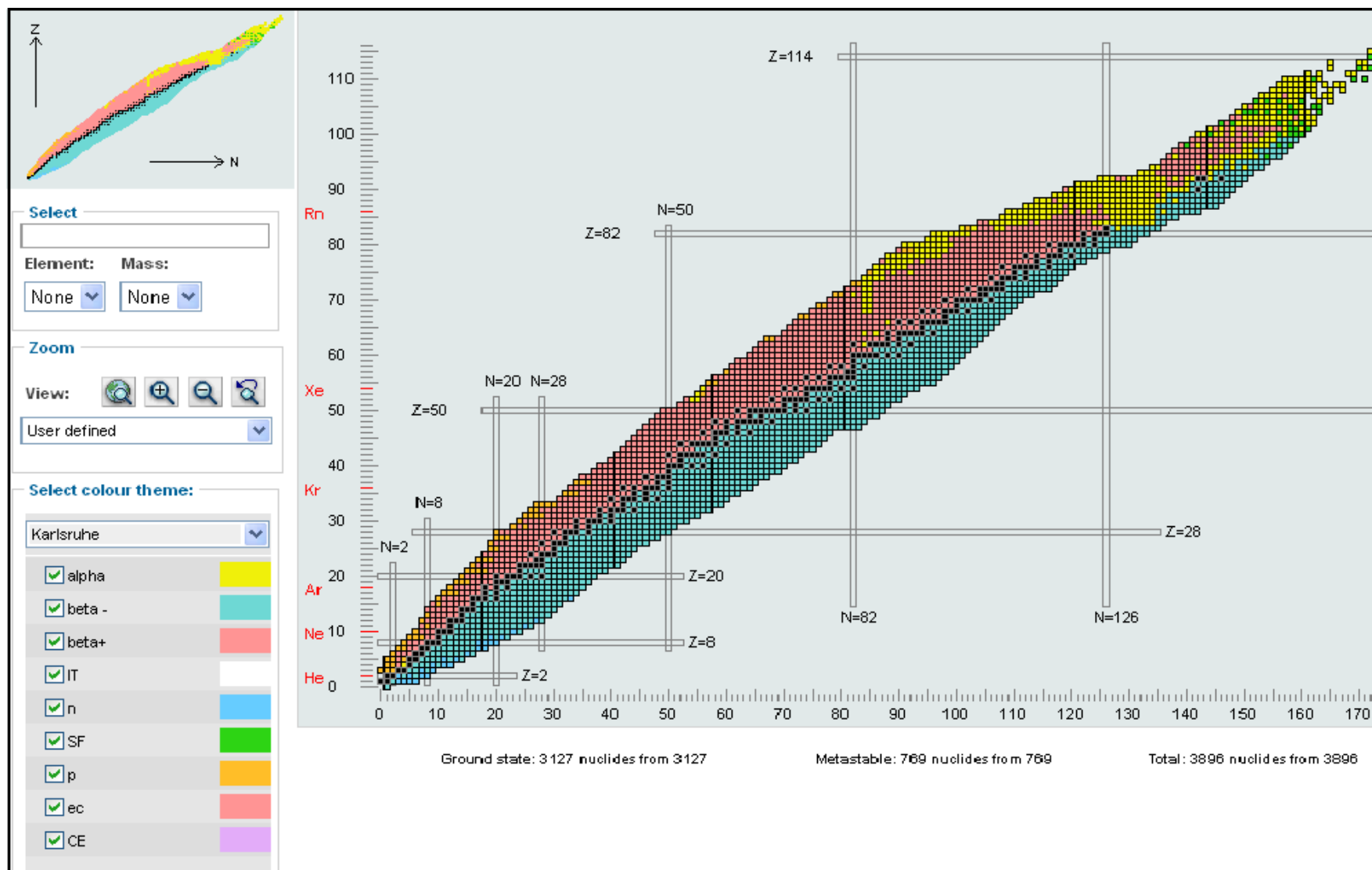
My Sources

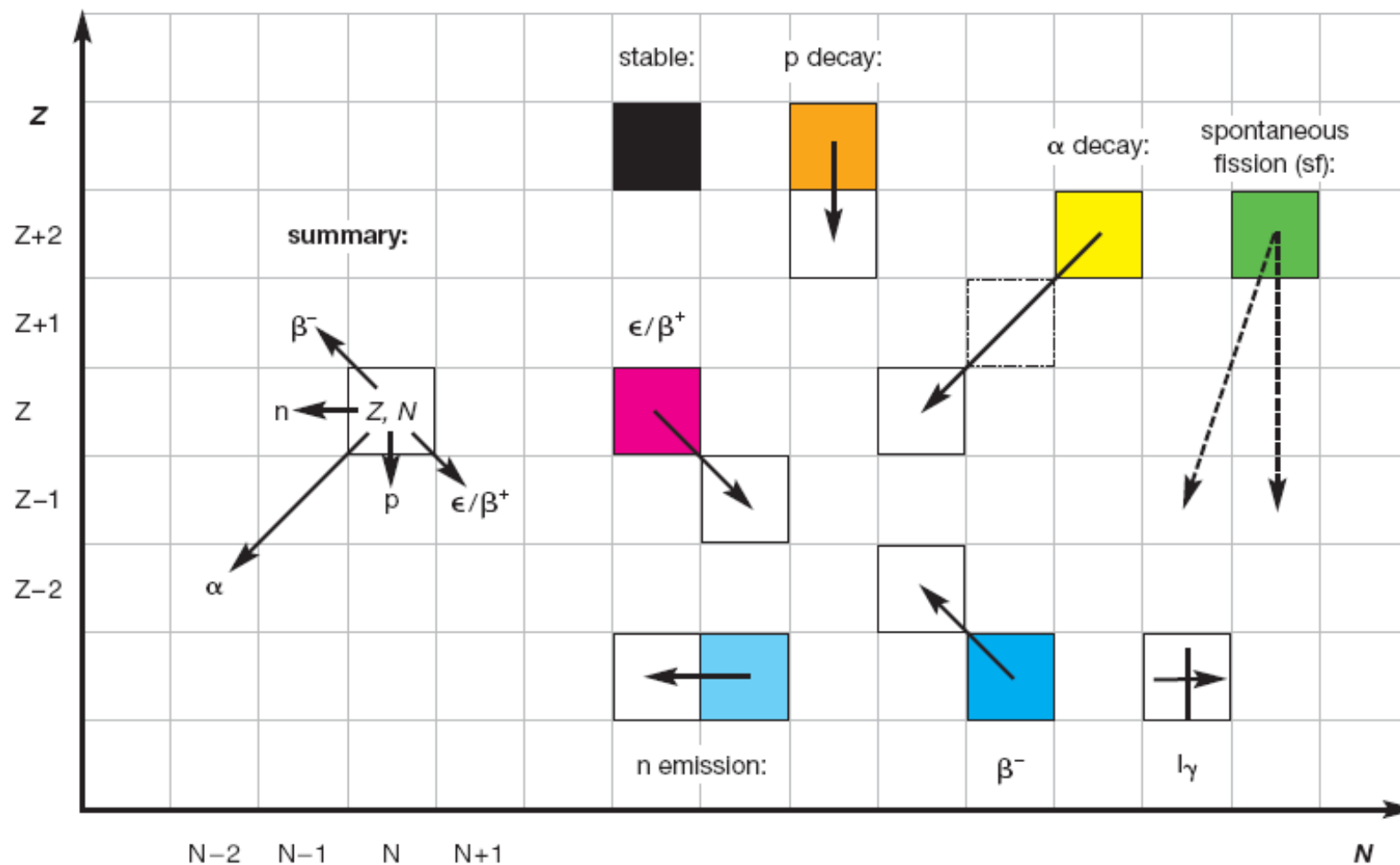
- goto

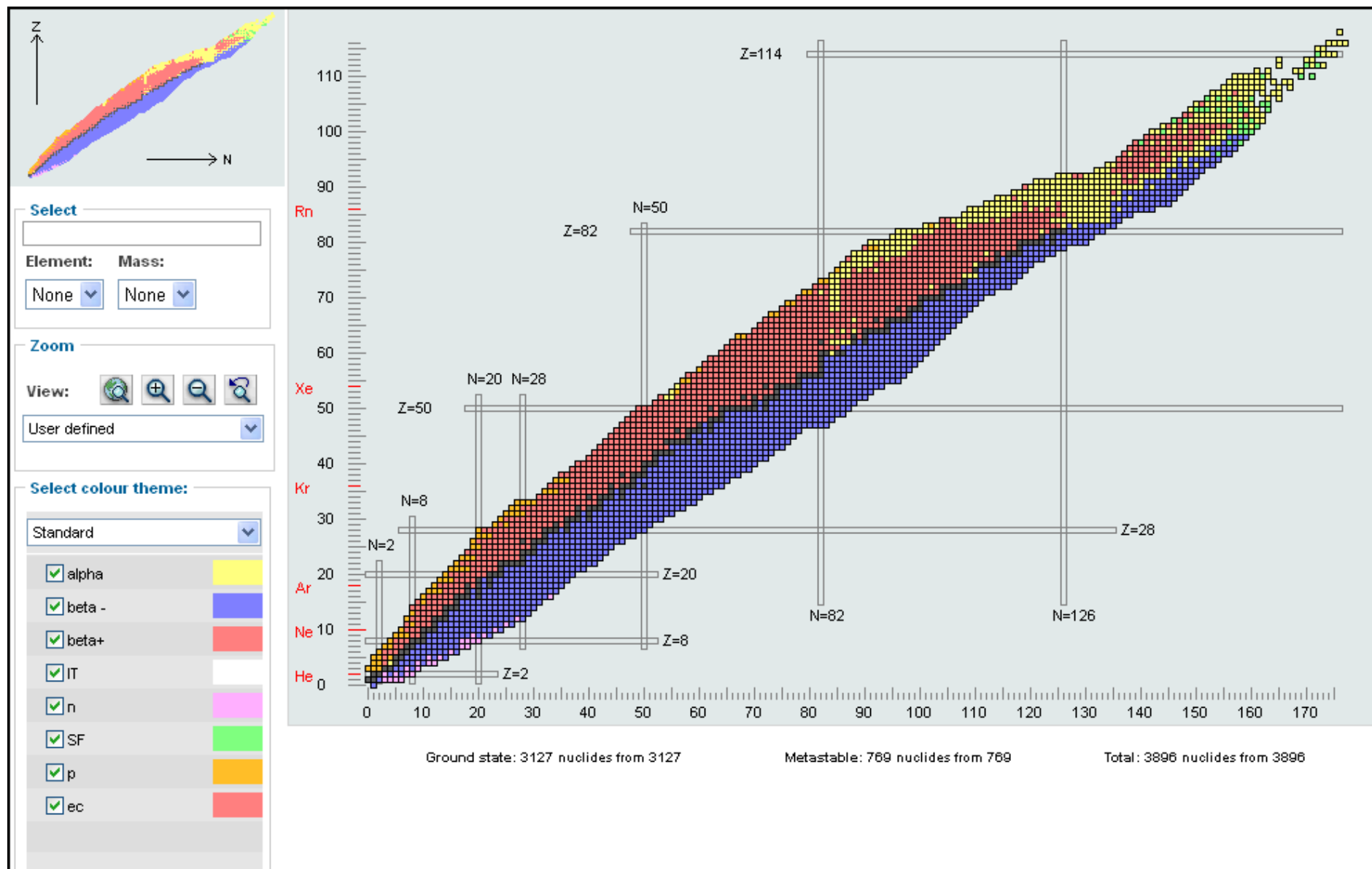
My Messages

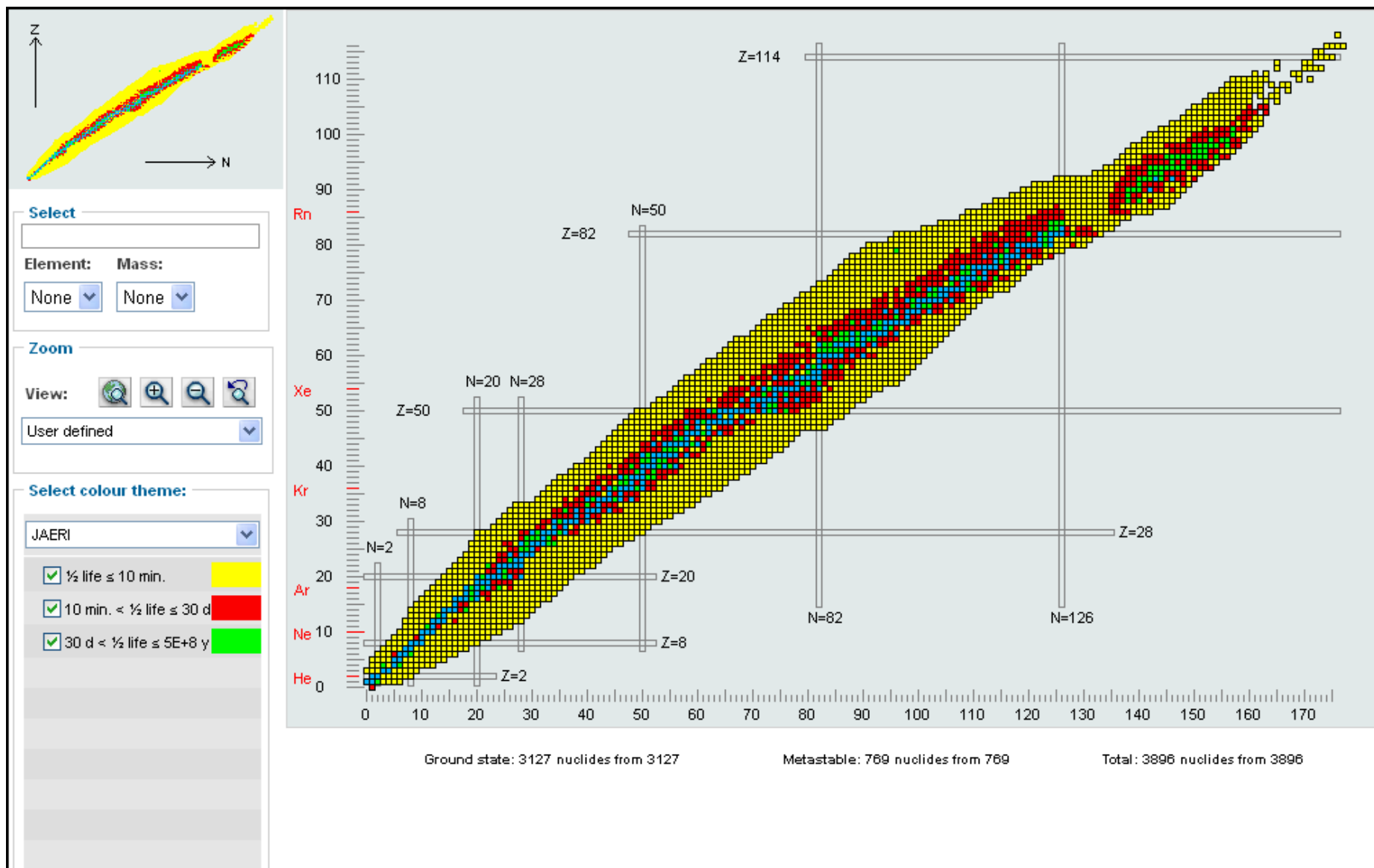
- NAMLS-9 International Conference on Nuclear Analytical Methods in the Life Sciences
- Open positions at the University of Liège
- NEVI The next Nucleonica training course 25/26 October 2007,

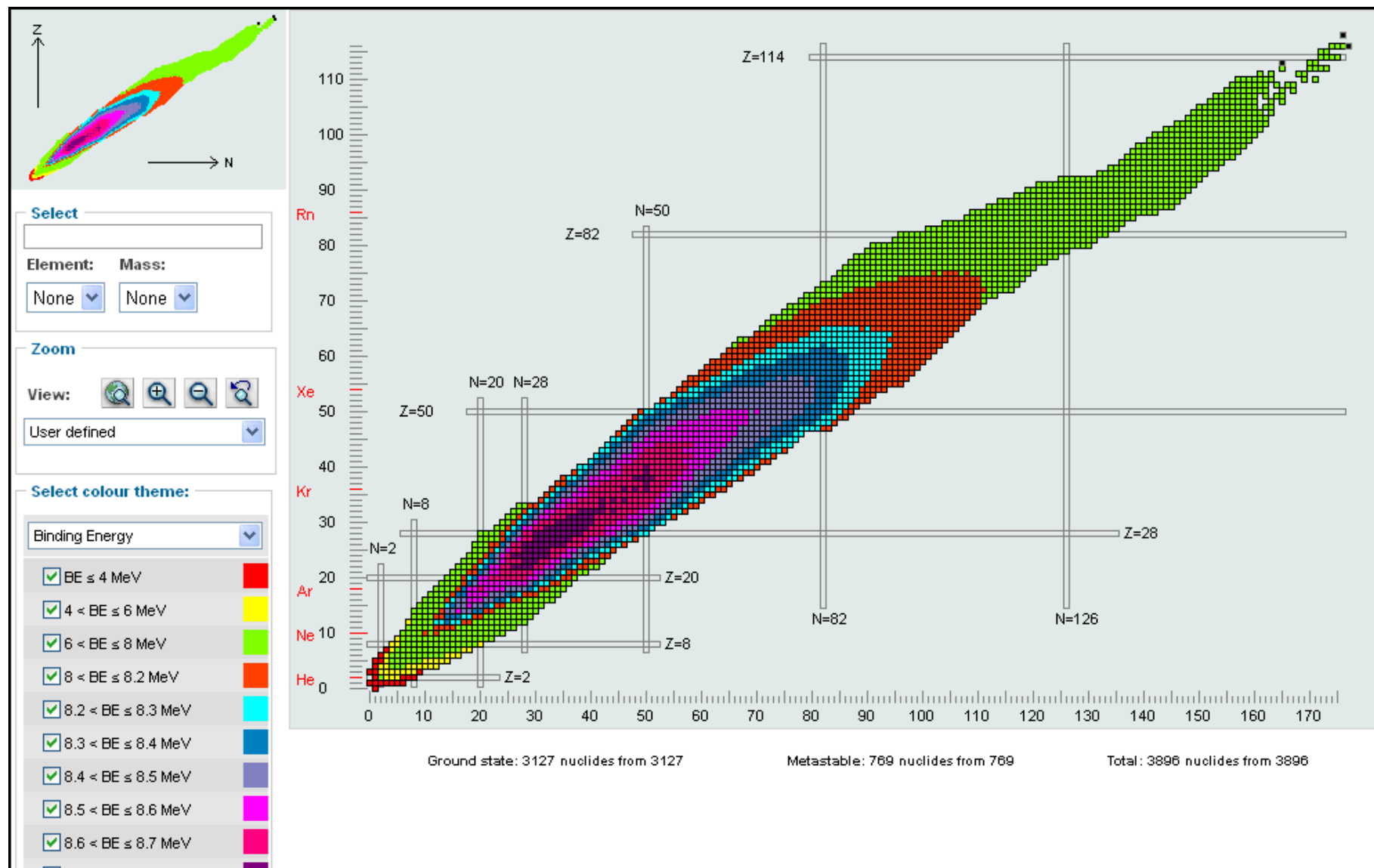
nucleonica [wiki]

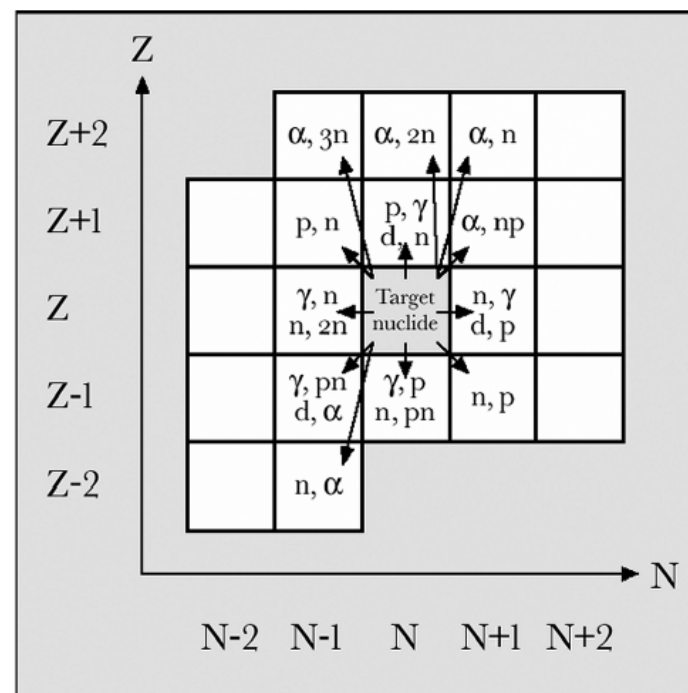
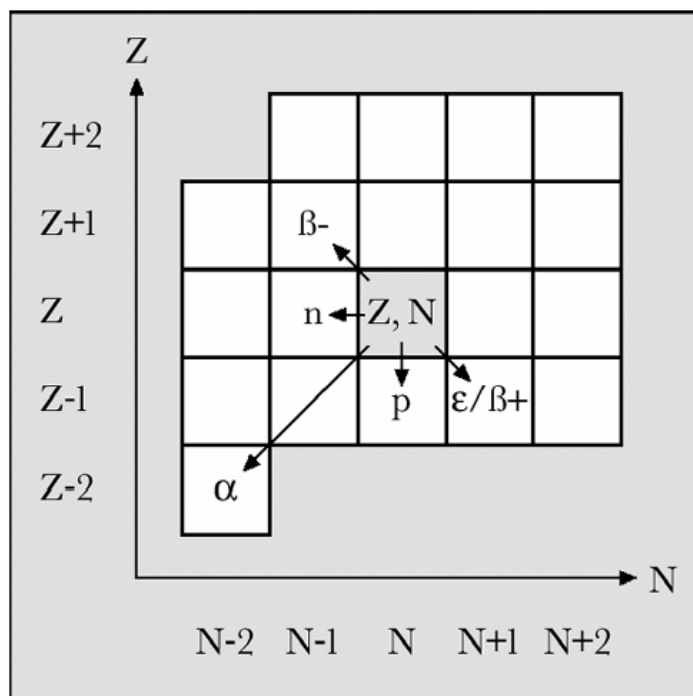




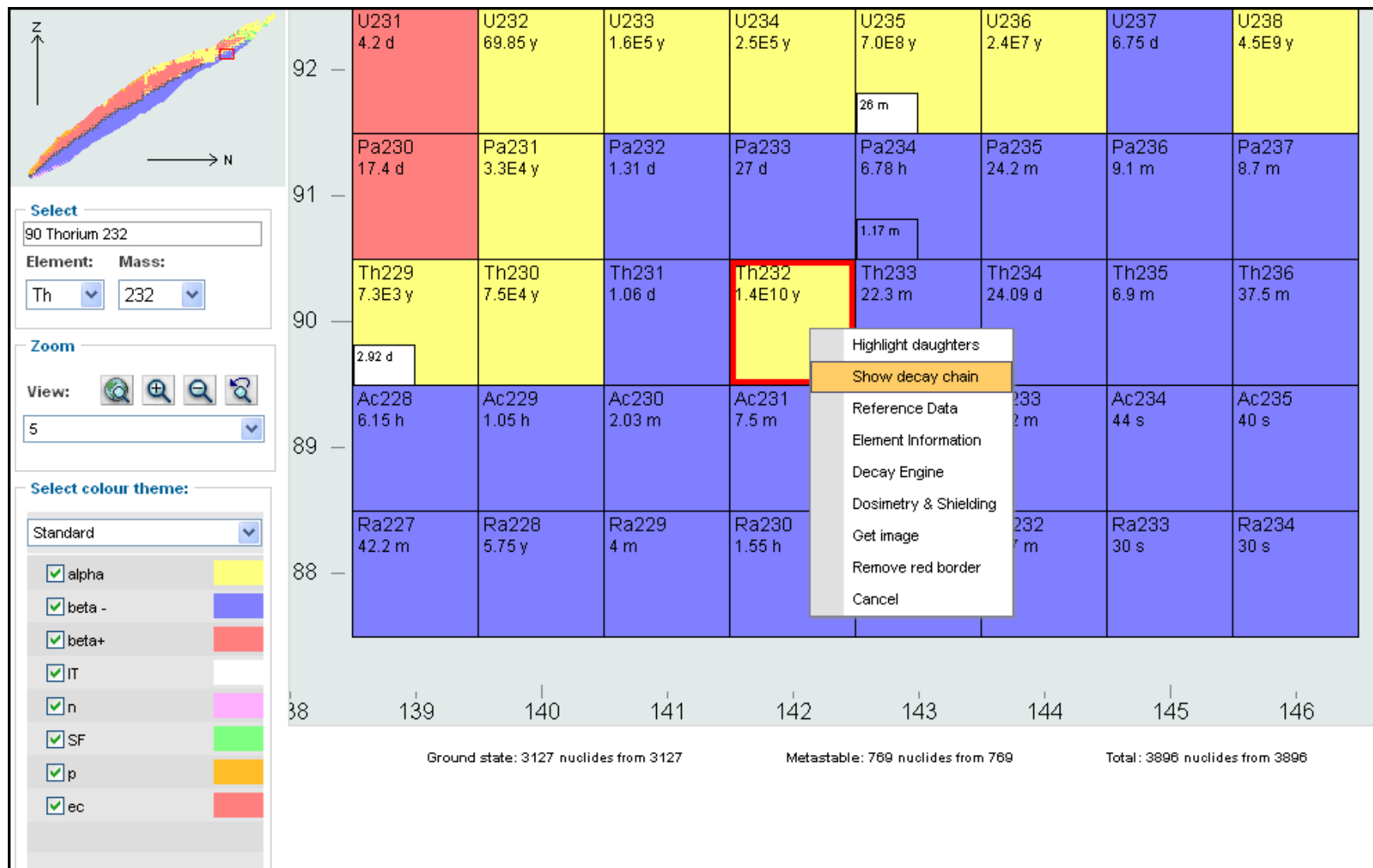


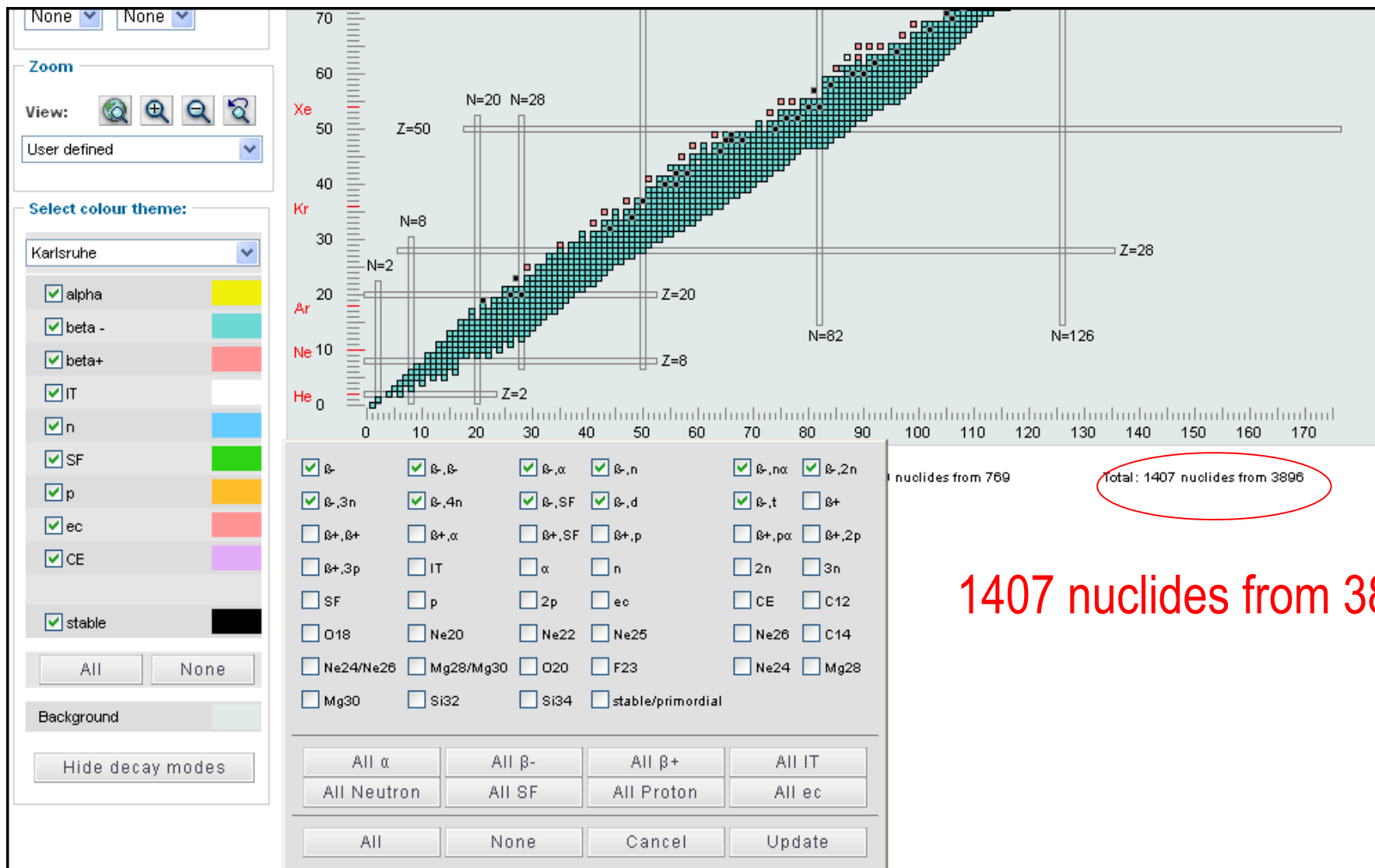




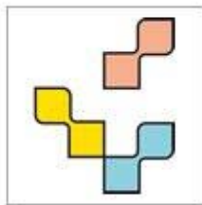


Two important features of the chart

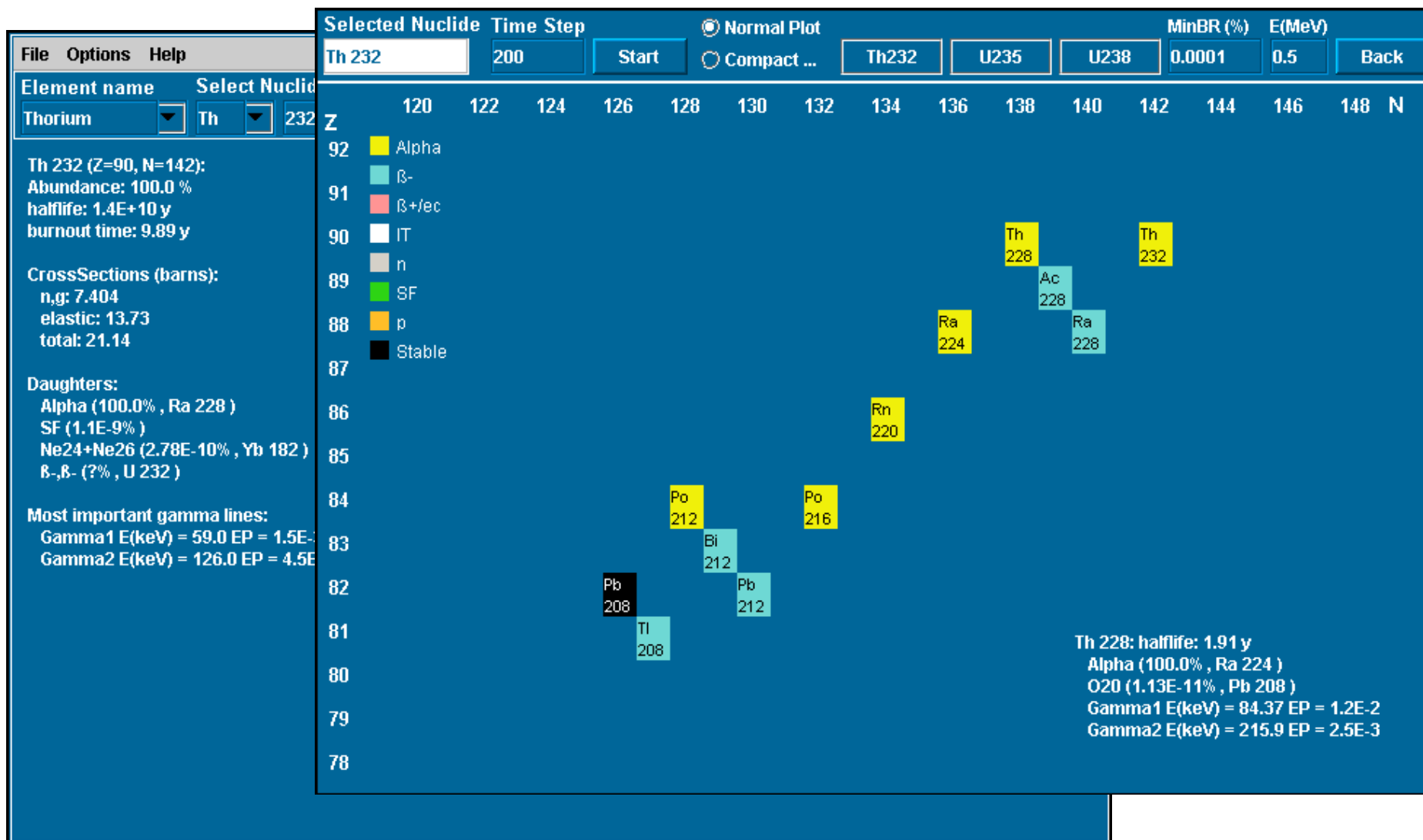




1407 nuclides from 3896



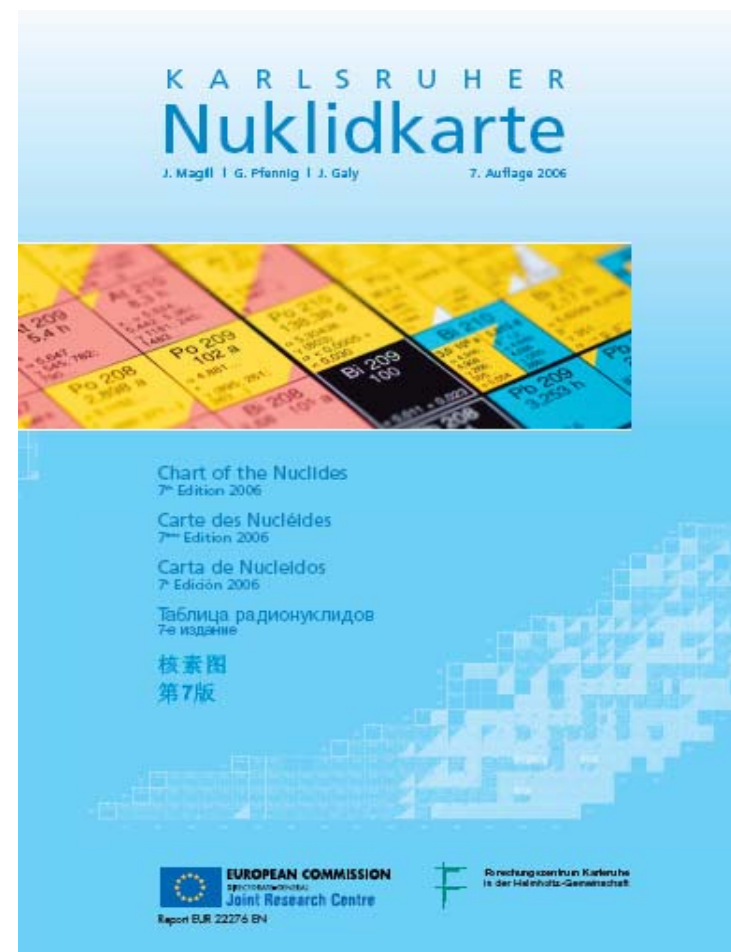
Universal Nuclide Chart



Karlsruher Nuklidkarte 2006 7th edition, G. Pfennig, J. Magill, J. Galy.

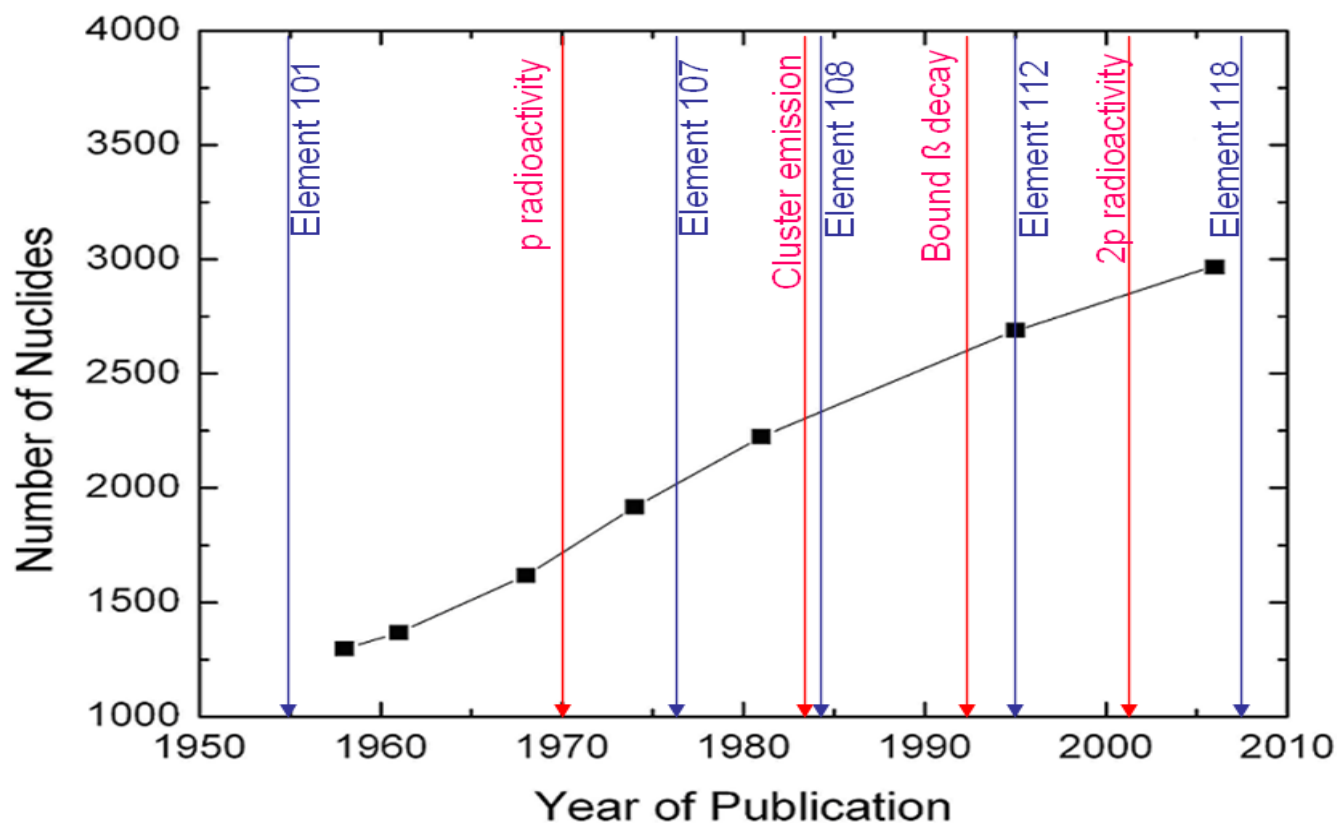
**New nuclides and updates to
known nuclides**

- ➔ **612 updated nuclides**
- ➔ **Broschure with explanation in 6
different languages; English,
German, French, Spanish,
Russian and Chinese.**
- ➔ **Restricted but essential
information shown**



Number of Nuclides for the 7th edition: 2962 ground states and 692 isomers

Progress in nuclear structure knowledge



Number of Nuclides in the KN editions

2p radioactivity:

Short-life nuclides: ${}^6\text{Be}$, ${}^8\text{C}$, ${}^{12}\text{O}$, ${}^{16}\text{Ne}$, ...

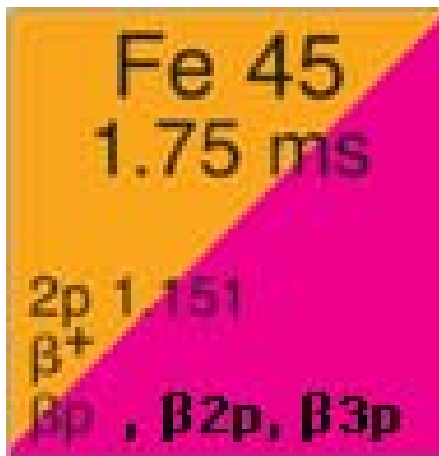
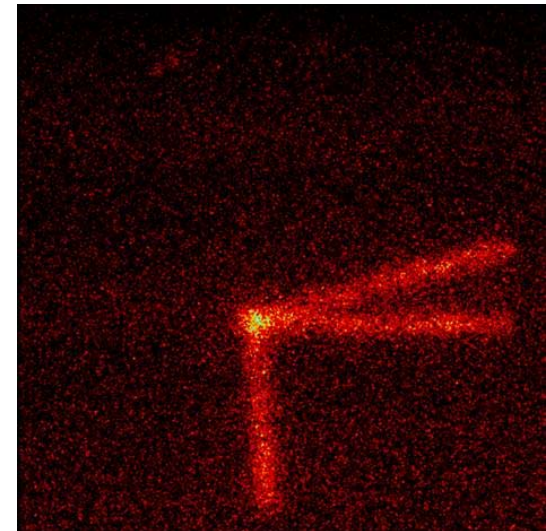
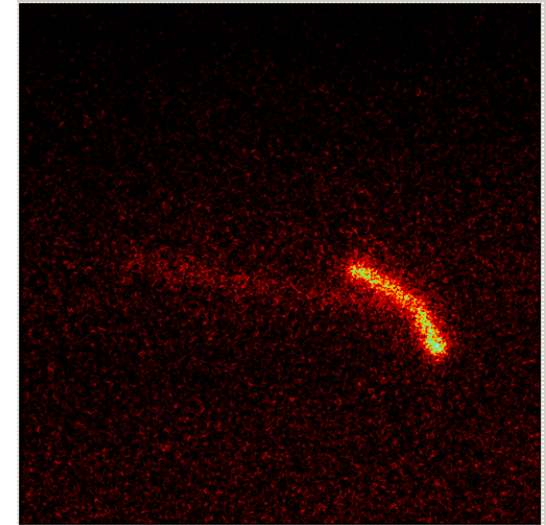
Excited States (Isomers): ${}^{94m_2}\text{Ag}$, ...

Pure 2p radioactivity: ${}^{45}\text{Fe}$, ${}^{48}\text{Ni}$, ${}^{54}\text{Zn}$, ...

Direct observation of 2p in ${}^{45}\text{Fe}$:

M. Pfützner, et al., *Eur. Phys. J. A* 14, 279 (2002).

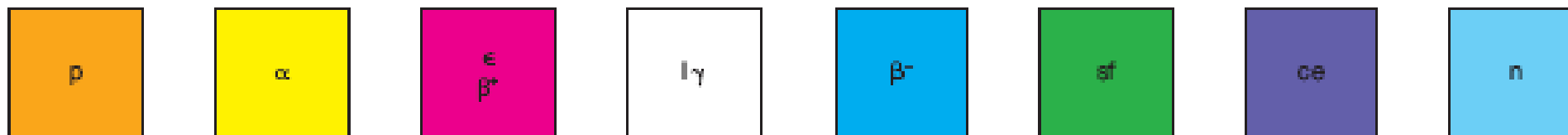
J. Giovinazzo, et al., *Phys. Rev. Lett.* 89, 102501 (2002).



Additional βnp modes

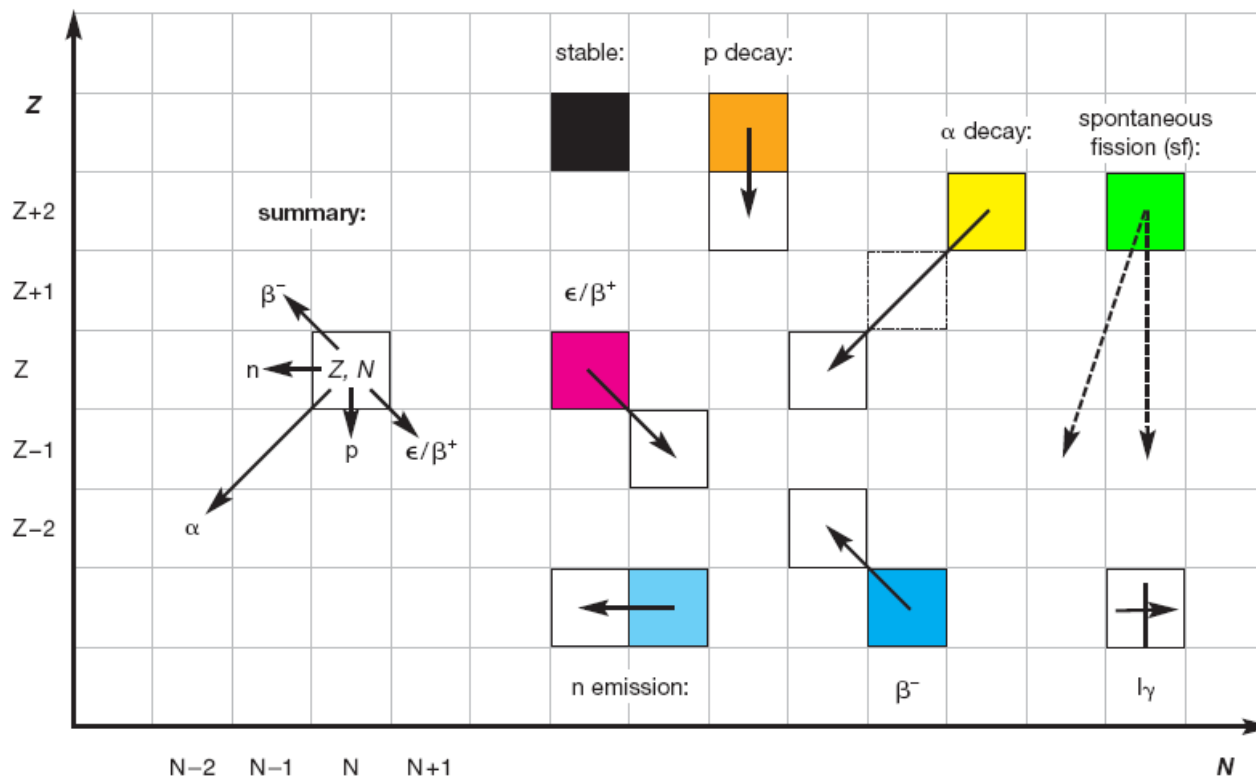
K. Miernik, et al., *Phys. Rev. C* 76, 041304 (2007)

Images courtesy of M. Pfützner .

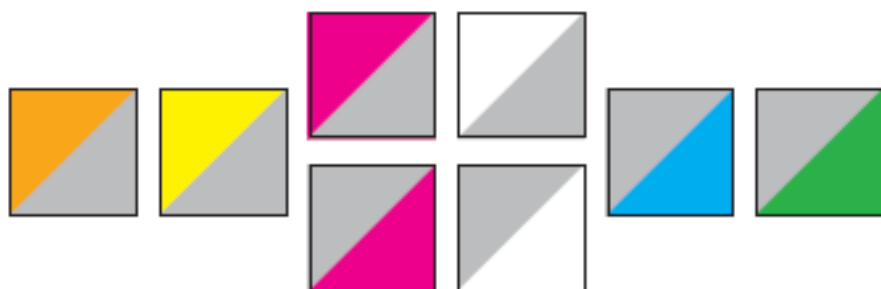
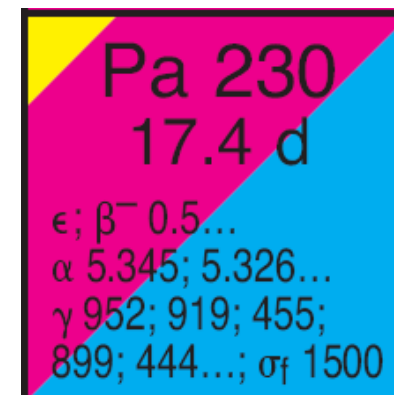


Colour ↔ Decay Mode

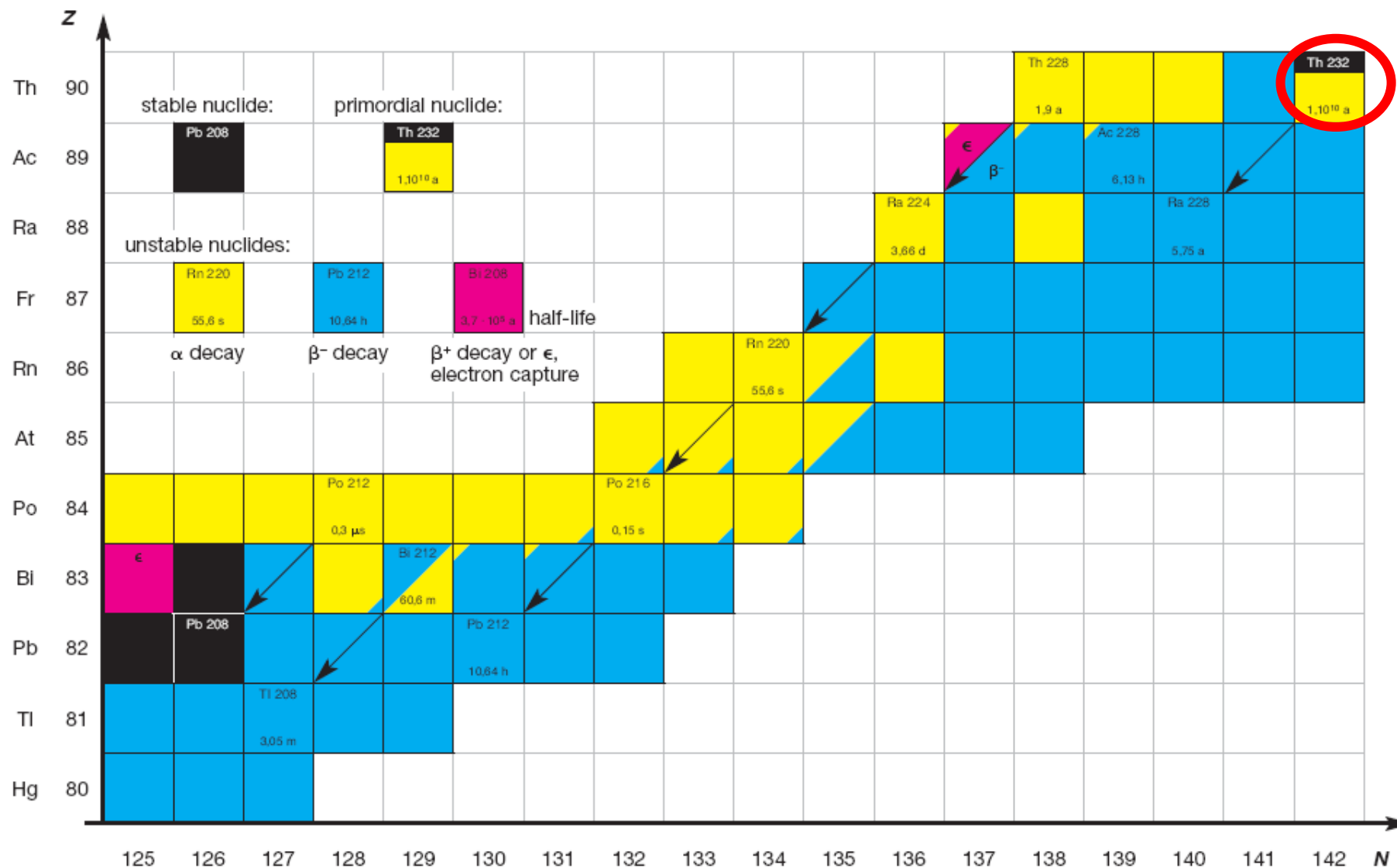
- ➡ Only experimentally observed nuclides.
- ➡ Colour scheme based on the decay modes. Multiple decay modes indicated.
- ➡ Additional spectral data is also provided; half-lives, energies, abundancies, cross-sections, etc...



Colours \longleftrightarrow Decay Modes



Branching ratios \longleftrightarrow Coloured areas



Nucleonica Wiki Webpage

Translations

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Help:Karlsruhe Nuclide Chart

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Introduction

The 7th edition (2006) of the "Karlsruher Nuklidkarte" contains more than 600 nuclides not found in the previously published editions, 692 isotopes experimentally observed nuclides and 692 isotopes with unknown weights, isotopic abundances and cross sections for both ^{235}U and ^{239}Pu . The accompanying history and overview of nuclear science. The brochure has been extended from the original four languages to include Chinese and Russian.

For almost 50 years, the Karlsruhe Nuclide Chart

Explanation of the Nuclide Chart

For further information on the Karlsruhe Nuclide Chart, 7th edition, we have extracted the multilingual "Explanation of the Chart of the Nuclides" from the brochure. The pdf's can be found below for download:

English/German [\[pdf\]](#) Explanation of the Chart of the Nuclides
Erläuterungen zur Nuklidkarte

Spanish/French [\[pdf\]](#) Explicaciones de la carta de nucleidos
Explication de la carte des nucléides

Chinese/Russian [\[pdf\]](#) 核素图解释
Пояснения к таблице нуклидов

Italian/French translated by M.R.Tedeschi [\[pdf\]](#) Spiegazione della carta dei nuclidi


English/Japanese translated by Dr. K. Uozumi [\[pdf\]](#) 「核種チャート」の解説

English/Korean translated by Dr. P. Lee [\[pdf\]](#) 핵종(核種) 도표 설명

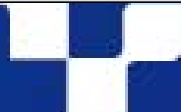
English/Romanian tr. by Dr. Catalin ALECU [\[pdf\]](#) Explicatii privind Harta nuclizilor

These documents provide a comprehensive explanation on how to use the Karlsruhe Nuclide Chart.

Additional translations? Are you interested in translating the "Explanation of the Chart of the Nuclides" into your own language? If so, please contact: Joseph Magill (joseph.magill@ec.europa.eu)



Karlsruhe Nuclide Chart wallchart, 7th Edition

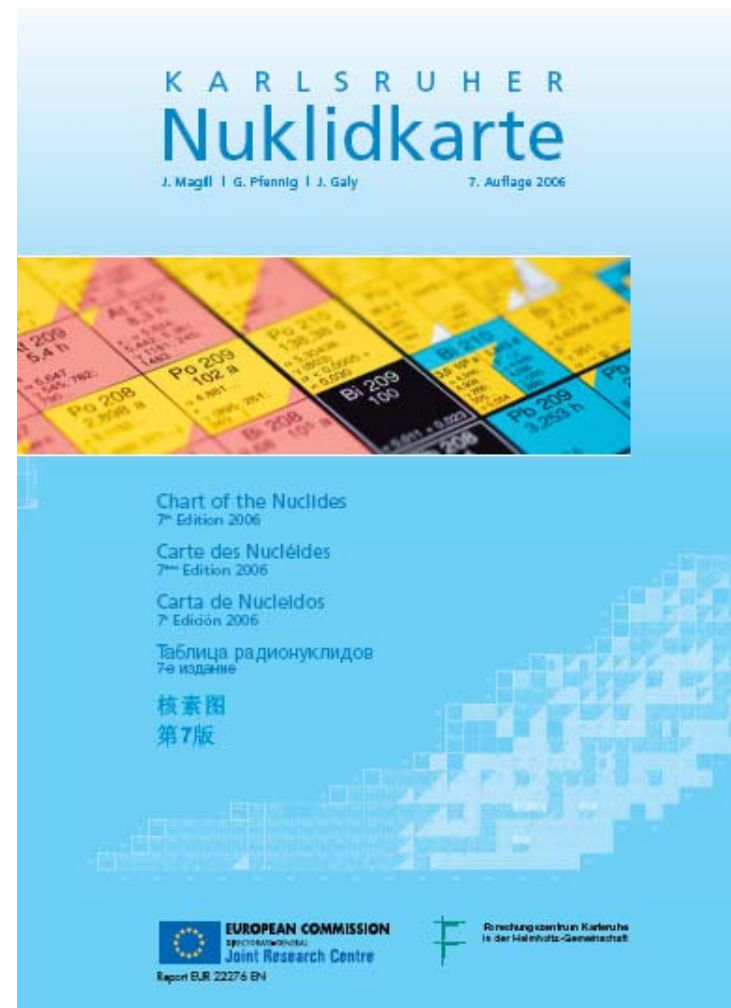
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***An important tool for
nuclear scientists***

***Choice of the database &
of the physics/colour
scheme***

***Huge advantage of
Nucleonica giving
access to all related
information***

***More information at
www.nucleonica.net***



Thanks!

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